# Unit 3: Coding for Fourth Graders

Content Area: **English Language Arts**
Course(s):
Time Period: **Trimester 2**
Length: **8-10 sessions**
Status: **Published**

## Brief Summary of Unit

Students will be continue to code and build upon their computational thinking through age appropriate websites/manipulatives. Computational thinking is problem solving in an efficient way. It can include knowing how and when to use computing tools, knowing what steps you need to take to solve a problem, and logically organizing and analyzing data. In addition, students apply the knowledge they have learned in this unit through the programming of various coding robots such as Botley, Ozobots, Dot, Dash, and Spheros. Additional enrichment and continued coding skills are always offered activities through monthly and seasonal choice boards.

This unit is designed to be part of a developmental progression across grade levels and make interdisciplinary connections across content areas including physical and social sciences, technology, career readiness, cultural awareness, and global citizenship. During this course, students are provided with opportunities to develop skills that pertain to a variety of careers.

Revision Date: July 2023

## Standards

This unit challenges students to locate, evaluate, and use information effectively. Information literacy includes, but is not limited to, digital, visual, media, textual, and technological literacy. Lessons may include critical thinking and using information resources as well as the social and ethical issues surrounding the use of information.

The identified standards reflect a developmental progression across grades/ levels and make interdisciplinary connections across content areas including social sciences, technology, career readiness, cultural awareness and global citizenship. The standards that follow are relevant to this course in addition to the associated content-based standards listed below.

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| LA.SL.4.1 | Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly. |
| LA.SL.4.1.D | Review the key ideas expressed and explain their own ideas and understanding in light of the discussion. |
| LA.SL.4.2 | Paraphrase portions of a text read aloud or information presented in diverse media and formats (e.g., visually, quantitatively, and orally). |
| LA.SL.4.3 | Identify the reasons and evidence a speaker provides to support particular points. |

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| I | Inquire: Build new knowledge by inquiring, thinking critically, identifying problems, and developing strategies for solving problems. |
| I.A.1 | Formulating questions about a personal interest or a curricular topic. |
| I.A.2 | Recalling prior and background knowledge as context for new meaning. |
| I.C | Learners adapt, communicate, and exchange learning products with others in a cycle that includes: |
| I.C.1 | Interacting with content presented by others. |
| I.C.2 | Providing constructive feedback. |
| I.C.3 | Acting on feedback to improve. |
| I.D | Learners participate in an ongoing inquiry-based process by: |
| I.D.1 | Continually seeking knowledge. |
| I.D.2 | Engaging in sustained inquiry. |
| I.D.3 | Enacting new understanding through real-world connections. |
| I.D.4 | Using reflection to guide informed decisions. |
| V | Explore: Discover and innovate in a growth mindset developed through experience and reflection. |
| V.A.2 | Reflecting and questioning assumptions and possible misconceptions |
| V.B | Learners construct new knowledge by: |
| V.B.2 | Persisting through self-directed pursuits by tinkering and making. |
| V.C | Learners engage with the learning community by: |
| V.C.1 | Expressing curiosity about a topic of personal interest or curricular relevance |
| V.C.3 | Collaboratively identifying innovative solutions to a challenge or problem |
| TECH.8.1.2.A.3 | Compare the common uses of at least two different digital applications and identify the advantages and disadvantages of using each. |
| TECH.8.1.5 | Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge. |
| TECH.8.1.5.D.CS1 | Advocate and practice safe, legal, and responsible use of information and technology. |
| TECH.8.2.5 | Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment. |

## Essential Questions/Enduring Understandings

- ● How can I use computational thinking to solve simple problems?
- ● What is computational thinking?
- ● What vocabulary words are used in computer programming?
- ● Why is it important to use coding vocabulary appropriately?
- ● How can I program a coding robot to perform a simple task?
- ● How does computational thinking allow me to solve simple problems?

## Students Will Know/Students Will Be Skilled At

- Programming a coding robot to successfully perform a variety of simple tasks.
- Programming various lessons through a coding course on code.org.
- Simple problems may be solved with computational thinking
- To apply existing knowledge to generate new ideas
- Utilizing age appropriate coding activities to build an understanding of the basics of programming.
- Utilizing coding terms appropriately and regularly during class discussions and group work.

## Evidence/Performance Tasks

Students demonstrate differentiated proficiency through both formative and summative assessments in the classroom. Based on individual student readiness and performance, assessments can be implemented as formative and/or summative.

Developmental progression across years in media is evidenced through benchmark assessments as part of the media specialist's Student Growth Objective (SGO). Follow up diagnostic assessments are used to target skill remediation. Student proficiency allows for additional or alternative assessment based on demonstration or absence of skill.

The performance tasks listed below are examples of the types of assessments teachers may use in the classroom and the data collected by the district to track student progress.

- Benchmark: Students demonstrate proficient and appropriate use of coding vocabulary terms through an SGO assessment in the form of a Google Form Quiz.
- Formative: Students independently utilize introductory games/tools that teach the elements of basic coding.
- Formative: Students independently code various lessons utilizing code.org.
- Summative: Students work collaboratively in groups to navigate coding robots through an obstacle course/maze.

## Learning Plan

Media Specialists may personalize instruction during this unit and address the distinct learning needs, interests, aspirations, or cultural backgrounds of individual students.

Students are exposed to STEM-related activities during this unit allowing them to experience varied disciplines including science and mathematics.

Media Specialists at the elementary level design their own unique lesson plans in order to incorporate the essential questions provided in this unit. The order in which this information is presented is dependent upon the variables specific to each elementary school community. For example, students may be called to the carpet for a lesson followed by guided practice, then independent practice. After the lesson, students will

check out books.  Library Media time ends with an electronic story or students going to a makerspace station.

Fourth grade students will review and continue to build coding and computational thinking through age appropriate websites/manipulatives. Computational thinking is  problem solving in an efficient way. It can include knowing how and when to use computing tools, knowing what steps you need to take to solve a problem, and logically organizing and analyzing data. This unit incorporates code.org curriculum for second grade and various coding robots appropriate for grade level.

Code.org coding lessons should be completed in order following the progresson of Course A to Course F. Grade 4 should ideally focus on the lessons in Course D.

Course D Lesson Plans can be found at the following link: https://studio.code.org/s/coursed-2023?section_id=4625822&viewAs=Instructor. During this unit, students usually do lessons 2-7 in Code.org. See below for description and lesson plans.

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Course D (2023) Overview:

Course D for students in third and fourth grade. The course begins with a review of the concepts found in earlier courses, including loops and events. Afterward, students will develop their understanding of algorithms, nested loops, while loops, conditionals, and more.

Lesson 1 : Password Power-Up - Stronger, more secure online passwords are a good idea for everyone. But how can we help kids create better passwords and actually remember them? Use the tips in this lesson to help kids make passwords that are both secure and memorable.Common Sense's Digital Citizenship Curriculum addresses six core topics, based on the latest research on children, media, and technology. This lesson focuses on Privacy and Security. Students learn how to protect personal information and gain a deeper understanding of their data privacy rights so they can advocate for themselves and others.

Lesson 2 : Sequencing: Graph Paper Programming - In this context-setting lesson, students use symbols to instruct each other to color squares on graph paper. By "programming" one another to draw pictures, students get an opportunity to experience some of the core concepts of programming in a fun and accessible way. The goal of this activity is to build critical thinking skills and excitement for the course, while introducing some of the fundamental programming concepts that will be used throughout the course. By introducing basic concepts like sequencing and algorithms to the class in an unplugged activity, students who are intimidated by computers can still build a foundation of understanding on these topics. In this lesson, students will learn how to develop an algorithm and encode it into a program.

Lesson 3 : Introduction to Online Puzzles - In this skill-building lesson, students will practice their sequencing and debugging skills in maze puzzles. We recognize that every classroom has a spectrum of understanding for every subject. Some students in your class may be computer wizards, while others haven't had much experience at all. In order to create an equal playing (and learning) field, we have developed this "Ramp Up Stage" for Course D. This can be used as either an introduction or a review of how to use Code.org and basic computer science concepts. This stage covers all prerequisites needed to start Course D.

Lesson 4 : Relay Programming - This context-setting lesson will begin with a short lesson on debugging and persistence, then will quickly move to a race against the clock as students break into teams and work together to write a program one instruction at a time.

Teamwork is very important in computer science. Teams write and debug code with each other, instead of working as individuals. In this lesson, students will learn to work together while being as efficient as possible. This activity also provides a sense of urgency that will teach students to balance their time carefully and avoid mistakes without falling too far behind. This experience can be stressful (which is expected!) Make sure you provide students with the tools to deal with potential frustration.

Lesson 5 : Debugging with Laurel - In this skill-building lesson, students will practice debugging in the "collector" environment. Students will get to practice reading and editing code to fix puzzles with simple algorithms, loops and nested loops. The purpose of this lesson is to teach students that failure is normal when learning a new skill. Students will be given pre-written programs that do NOT work. They will be asked to fix these programs. This process, called debugging, teaches students essential problem solving and critical thinking skills. These skills transfer over as students proceed to harder and harder programming projects.

Lesson 6 : Events in Bounce - In this context-setting/skill-building lesson, students will learn what events are and how programmers use them in video games. Students will build a game that they can customize with different speeds and sounds. Events are very common in computer programs, especially in video games. In this lesson, students will develop their understanding of events by making a sports-based game. Students will learn to make their paddle move according to arrow keys, and make noises when objects collide. At the very end, they will get to customize their game to make it more unique!

Lesson 7 : Build a Star Wars Game - In this skill-building lesson, students will practice using events to build a game that they can share. CS Fundamentals is not simply about teaching computer science, it is about making computer science fun and exciting. In this series, students will learn about events using popular characters from Star Wars. These puzzles blur the lines between "learning" and "fun". Also, students will learn to recognize regular programming practices in games so that when they play games at home, they can see common computer science principles being used.

Lesson 8 : Dance Party - In this skill-building lesson, students will program an interactive dance party. This lesson introduces the core CS concepts of coding and event programming (using blocks).

Lesson 9 : Loops in Ice Age -

This context-setting/skill-building lesson will quickly introduce students to loops. In this lesson, students will be learning more about loops and how to implement them in Blockly code. Using loops is an important skill in programming because manually repeating commands is tedious and inefficient. With these Code.org puzzles, students will learn to add instructions to existing loops, gather repeated code into loops, and recognize patterns that need to be repeated.

Lesson 10 : Drawing Shapes with Loops -

This skill-building lesson builds on the understanding of loops from the previous lesson and doubles as a debugging exercise for extra problem-solving practice. This series highlights the power of loops with an array of puzzles meant to get students thinking about why `repeat` loops are superior to longhand.

Additional Lessons can be found here, if time permits.

- Demonstrate how to access age appropriate pre-selected online resources
- Demonstrate Sphero robots prior to use
- Mini lessons may include: Demonstration/modeling of how to safely use tools such as Botley robot, Ozobots, Spheros, ipads, laptops, as well as how to access appropriate online sites/application. Guided practice of online coding tutorials.
- Preview the essential questions and connect to learning throughout the unit.
- Refer to visual aids displayed in library media center
- Review Ozobot robots prior to use
- Utilize age appropriate coding tutorials
- Vocabulary to introduce: program, algorithm, looping, functions,
- Within the library media center have materials available for inquiry/ creative activities
- Review Botley robots prior to use

## Materials

The materials used in this course allow for integration of a variety of instructional, enrichment, and intervention materials that support student learners at all levels in the school and home environments. Associated web content and media sources are infused into the unit as applicable and available.

Code.org and specific robots earmarked for each grade are core materials used by all library media specialists across district.

Suggested Supplemental Resources:

- https://hourofcode.com/us/learn (Hour of Code website)
- https://code.org/educate/curriculum/elementary-school (lesson plans)

- https://www.scratchjr.org (Scratch Jr application)
- Coding Choice Board for 3-6
- How to Code a Roller Coaster
- Debugging Review (Google Slides)
- Ozobots
- Botley Robots
- Sphero Robots
- Dot Robots
- Dash Robots
- Samsung Tablets to program the robots
- Cubelets
- SmartPanel

- Age appropriate online websites
- Age appropriate websites/applications
- Botley Coding Robot
- Computer technology (Ipads/Laptops)
- Dot and Dash Robots
- Interactive board technology
- Presentation software
- Visual aids

## Strategies for Accommodation and Modification

Content specific accomodations and modifications as well as Career Ready Practices are listed here for all students, including: Special Education, English Language Learners, At Risk of School Failure, Gifted and Talented, Students with 504.